

Two New Species of the Family Ceratocanthidae from Taiwan

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Abstract Two new species of the family Ceratocanthidae are described under the names of *Madrasostes taiwanense* sp. nov. and *Madrasostes suzukii* sp. nov. This is the first article dealing with the occurrence of the family Ceratocanthidae from Taiwan.

The Ceratocanthidae is a moderate-sized family of the Scarabaeoidea containing over 250 species in the world (1992, OCHI, p. 1). Members of this family are mainly distributed in the forests of the tropical and subtropical zones. In tropical Asia, seven genera and more than 50 species have been recorded. The northern periphery of the distributional area of this family in Asia is Kagoshima at the southern part of Kyushu, Southwest Japan. However, no species has hitherto been known from Taiwan.

The beetles of this family possess very remarkable characteristics: the body and legs are contractile, and also the body is capable of rolling up like a ball. They are often found under the bark of rotten wood lying on the forest floor. In Japan, *Madrasostes kazumai* OCHI, JOHKI et NAKATA, 1990, was recorded from the gallery of wood-feeding termites, *Coptotermes formosanus* SHIRAKI on Nakanoshima Island, the Tokara Islands, Southwest Japan (IWATA *et al.*, 1990). The larvae of the beetles are known to feed on the detritus of termites and wood-feeding cockroaches.

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The holotypes to be designated in this paper will be deposited in the National Museum of Natural History, Taichung (=NMNHT), and the National Science Museum (Nat. Hist.), Tokyo (=NSMT).

Madrasostes taiwanense sp. nov.

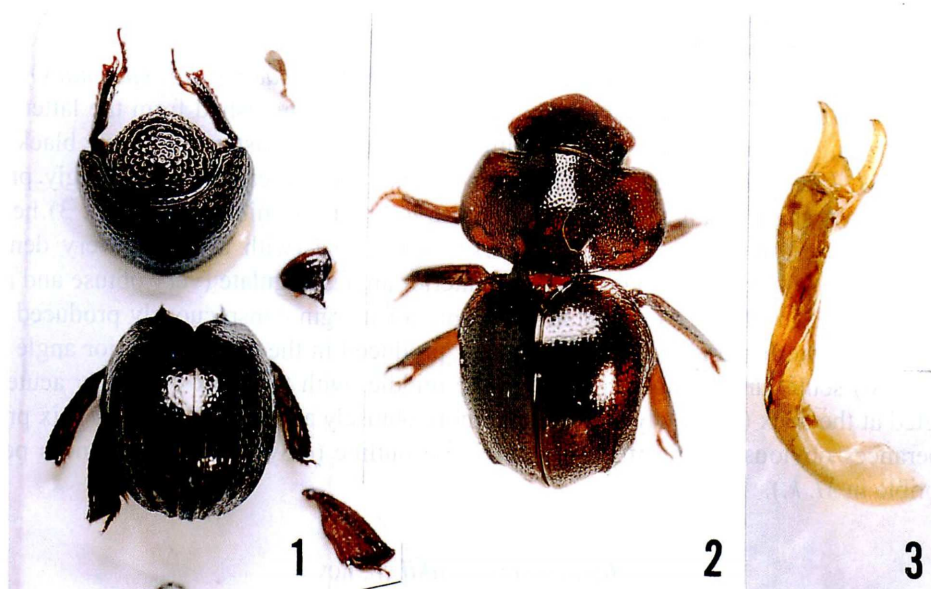
(Fig. 1)

Body well convex above. Colour black, dorsal side with a moderate cupreous tinge; ventral side somewhat reddish, strongly shining; legs black with a slight cupreous tinge.

Head subpentagonal, strongly convex anteriad, a little transverse, with interspaces between punctures shining; clypeus widely and triangularly produced forwards, distinctly serrate along outer margin, with a strong sharp tooth at the middle; genal angles well produced laterad and toothed; ocular canthus well developed posteriad and extending to apical five-sixths of eye length; clypeo-genal suture indistinct; surface rather sparsely covered with round, coarse, ocellate to horseshoe-shaped shallow punctures on disc, which are clearly arranged in concentric circles; marginal portion of head with long fine sculptures. Eye obviously narrow and elongate in dorsal view. Antennae with ten segments.

Pronotum simple in shape, about 1.7 times as wide as long ($n=1$), shining smooth; apex bisinuate, conspicuously boldly bordered by a double marginal lines, outer margins becoming bolder laterad; lateral margins finely bordered; anterior angles angulate with rounded corners, posterior angles widely rounded; base weakly bisinuate, widely and roundly produced in middle, basal margin boldly bordered, the border boldest at the middle; surface rather sparsely covered with similar-sized punctures to those on head in middle, becoming coarser and denser laterad, each with a short fine hair. Scutellum moderate-sized, rather acutely angled at apex, triangularly concave at the middle, rugoso-punctate and pubescent.

Elytra strongly convex, distinctly subglobular, about 1.2 times as long as wide, noticeably circular in outline though bearing six protuberances near apices clearly perceptible in dorsal view, with lateral margins produced ventrad in basal halves; each elytron with four weak dorsal longitudinal costae: the first costa (=sutural) almost reduced and not raised in anterior two-thirds, distinctly raised in posterior third; the second costa very slightly raised in apical five-sixths and distinctly raised in posterior sixth, though once interrupted near apex; the third costa weakly raised from anterior



Figs. 1–3. *Madrasostes* spp. from Taiwan. — 1, Habitus of *M. taiwanense* sp. nov., female, holotype; 2, habitus of *M. suzukii* sp. nov., male, holotype; 3, male genitalia of *M. suzukii* sp. nov.

fifth to posterior fourth, rather strongly so in apical 4th though the costa is interrupted two or three times, with the basal fifth weakly impressed; the fourth costa weakly raised from anterior third, becoming stronger posteriad and reaching before apex; first interval finely striate in posterior third along the first costa, with a row of ocellate punctures; surface shallowly, somewhat densely covered with horseshoe-shaped coarse punctures, which are open posteriad, finely haired, and longitudinally, rather regularly ranged; lateral parts of elytron with longitudinal sculptures.

Epipleuron with a carina strongly elevated in basal half, then gradually becoming obsolete posteriad. Protibiae a little asymmetrical between right and left ones: the left protibia with outer margin bearing two strong apical teeth, the remaining part coarsely serrate with four distinct denticles; the right protibia with two apical teeth, the first very small and the second large, the remaining part of outer margin coarsely serrate with six denticles. Mesotibia oblong, 3.6 times as long as wide, with inner margin weakly sinuate at the middle, outer margin finely serrate in oblique view. Metatibia subtriangular, about 1.9 times as long as wide, ventral side with the internal half bearing five or so fine longitudinal carinae, the external half transversely sculptured; dorsal side feebly rugulose and haired in external two-thirds, three carinae running in internal third; internal (ventral) margin sinuate at the middle, external (dorsal) margin distinctly serrate; two terminal spurs simple in shape. Metatarsi distinctly short, about 7/10 as long as the width of apex of metatibia.

Length: 7.2 mm; width: 2.8 mm.

Holotype: ♀, "Taiwan, Taitung Hsieng, Chihpeng, (litter, 400 m), 1–IV–2002, Hiroshi SUGAYA leg." (NSMT).

Notes. The present new species is closely related to *Madrasostes kazumai* OCHI, JOHKI et NAKATA, 1990, from Japan, but can be easily distinguished from the latter by the following characteristics: 1) body with a slight cupreous lustre (uniformly black in *M. k.=M. kazumai*); 2) head strongly convex with the clypeal margin strongly produced into a sharp tooth at the middle (obtuse tooth at the middle in *M. k.*); 3) head with punctures shallower and rather sparse on the disc (with deep and very dense punctures in *M. k.*); 4) pronotum with the anterior angles angulate (very obtuse and almost rounded in *M. k.*); 5) pronotum with anterior margin conspicuously produced in the area of anterior angle (not conspicuously produced in the area of anterior angle in *M. k.*); 6) scutellum strongly concave in the middle, with the apex obviously acutely angled at the apex (shallowly concave and more obtusely angulate in *M. k.*); 7) six protuberances obviously perceptible on the elytral outline (only four protuberances perceptible in *M. k.*).

Madrasostes suzukii sp. nov.

(Figs. 2–3)

Body convex, not so wide, strongly shining; dorsal side sparsely clothed with inconspicuous minute white hairs, each hair simple, not clavate at apex. Colour reddish-brown to blackish-brown, with slight purplish to greenish tinge on dorsal side; antenna reddish-brown; legs almost reddish-brown.

Head widely subpentagonal, weakly convex; clypeus broadly and triangularly produced forwards in middle, with outer margin not serrate but almost smooth, the median angle obtuse, neither distinctly produced forwards nor toothed; genal angles obtuse, round at corners; ocular canthus well developed, extending to apical five-sixths of eye length; clypeo-genal suture very fine; surface rather sparsely to moderately densely scattered with rather small, strong, round punctures on disc, which are not clearly arranged in concentric circles, interspaces between them shining; anterior marginal portion of head covered with rather long fine sculptures. Eyes rather large and oval in dorsal aspect. Antenna with ten segments.

Pronotum transverse, about 1.69 to 1.78 times as wide as long ($n=3$); antero-median portion just behind anterior margin slightly but clearly raised and transversely carinate; anterior margin bisinuate, rather boldly bordered by a double marginal lines; lateral margins slightly sinuate in front and almost rounded behind, with distinct marginal border; anterior angles very obtuse or rounded, posterior angles entirely rounded; basal margin weakly bisinuate, roundly produced and finely ridged in middle; surface moderately shining, densely covered with similar-sized punctures to those on head, those in anterior and medial parts strong and rounded, and those in lateral and posterior parts rather ocellate and open posteriad. Scutellum rather small and triangular, shining, scat-

tered with several irregularly shaped punctures.

Elytra convex, obviously narrower than pronotum, about 1.0 times as wide as long ($n=3$), with lateral margins produced ventrad in basal halves; each elytron with four weak longitudinal costae: the first (=sutural) costa almost reduced and not raised in anterior two-thirds, distinctly raised in posterior third; the second costa almost reduced and flat throughout, though the trace is barely perceptible as an impunctate longitudinal smooth area; the third costa very weak in anterior two-thirds though barely perceptible as an impunctate longitudinal smooth area as well as the second, and gradually raised in posterior third, strongly costate in posterior end; the fourth costa weakly raised in anterior two-thirds, and obviously stronger in posterior third; surface shallowly, somewhat densely covered with arcuate to horseshoe-shaped small punctures, which are open posteriad, become denser and duplicate, and partly form irregularly longitudinal or transverse sculptures in marginal portions.

Epipleuron with a carina strongly elevated in basal half, then gradually becoming obsolete posteriad. Protibiae rather slender, a little asymmetrical between right and left ones; the left protibia slightly more prolonged than the right in apical part, with outer margin bearing two apical teeth, the remaining part serrated with about nine denticles, which are rather sharp in the anterior part, and blunt in the posterior part, with inner margin widely, weakly gouged in middle, lobed antero-ventrad at basal quarter; the right portibia slightly wider than the left, with outer margin bearing two apical teeth, the remaining part serrated with some six rather sharp denticles in anterior part, and four to five blunt denticles in posterior part, with inner margin more weakly gouged in middle, more weakly lobed at basal four-fifths. Mesotibia oblong, 3.3 to 3.7 times as long as wide, with inner margin weakly sinuate, outer margin finely serrate in oblique aspect. Metatibia rather elongate, subtriangular, about 2.1 times as long as wide; ventral side with internal half bearing five or so fine longitudinal carinae, external half transversely sculptured; dorsal side coarse and irregularly reticulate in external two-fourths, smooth and shining in internal fourth; inner (posterior) margin smooth, outer (anterior) one finely serrate. Metatarsus almost of the same length as the width of metatibia.

Male genitalia about 1.5 mm in length, basal piece strongly twisted; lateral lobes 0.2 mm in length, subfalciform in apical half.

Length: 3.9–4.3 mm; width: 2.2–2.4 mm.

Holotype: ♂, Lanyu Island, Taiwan, 2–X–2004, J.-F. TSAI & J. Y. LIU leg. (NMNHT). Paratypes: 1 ♀, Same data as for the holotype; 1 ♀, Yeyou Vill., Lanyu Island, Taiwan, 29–III–2004, (FIT), W. SUZUKI leg.

Notes. The present new species is somewhat related to *Madrasostes tonkinense* PAULIAN, 1945, from “Tonkin”, but can be easily distinguished from the latter by the following characteristics: 1) head weakly convex (very strongly convex in *M. t.=M. tonkinense*); 2) surface of head rather sparsely covered with round strong punctures except for narrow anterior portion of clypeus (covered with fine transverse sculptures on anterior half and densely covered with irregular, coarse, ocellate punctures in *M. t.*); 3)

clypeal margin almost smooth (distinctly serrate in *M. t.*); 4) pronotum with anterior angles obtuse and rounded at the apices (truncate and sharpened at the external corners in *M. t.*); 5) pronotum densely covered with round strong punctures (densely covered with irregular coarse ocellate punctures in *M. t.*); 6) body reddish-brown to blackish-brown, with slight purplish to greenish tinge on the dorsal side (entirely greenish-bronze in *M. t.*).

Key to the Species of the Genus *Madrasostes* from Taiwan

- 1(2) Body rather robust, with pronotum not wider than elytra. Elytra distinctly globular, circular in outline. Head strongly convex; clypeus with a sharp tooth at the middle; clypeal margin distinctly serrate; disc densely and coarsely punctate, irregularly and arcuately sculptured in marginal portions, the punctures and sculptures forming a concentric circle. Pronotum sparsely covered in middle, and rather densely so with coarse horseshoe-shaped ocellate punctures. 7.2 mm. *M. taiwanense* sp. nov.
- 2(1) Body somewhat slender, with pronotum obviously wider than elytra. Elytra not distinctly globular, subquadrate in outline. Head weakly convex; clypeus without strongly produced, sharp tooth at the middle; clypeal margin not distinctly serrate; surface neither densely nor coarsely punctate on disc, irregularly and arcuately sculptured in anterior marginal portion, the punctures and sculptures never forming concentric circle. Pronotum densely covered with small punctures. 3.9–4.3 mm. *M. suzukii* sp. nov.

要 約

越智輝雄・蔡 経甫・益本仁雄：台湾産マンマルコガネムシ科 2 新種について。——台湾にマンマルコガネムシ科の甲虫の 2 新種が分布していることが判明した。そこで、本論文にて *Madrasostes taiwanense* sp. nov. と *M. suzukii* sp. nov. と命名した。また、両者を同定できる検索表もつけた。なお、台湾にこの科の昆虫が分布していることの報告としてもこの論文が最初である。

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